

REMARKS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

After entry of the foregoing amendment, Claims 1-45 are pending in the present application. Claims 1, 11, 22, 32, 33, and 36 are amended by the present amendment. No new matter is added.

In the outstanding Office Action, Claims 13 and 20 were rejected under 35 U.S.C. 102(b) as anticipated by U.S. Patent No. 4,977,839 to Fochtman et al. (hereinafter “Fochtman”); Claim 32 was rejected under 35 U.S.C. 102(b) as anticipated by U.S. Patent No. 5,720,232 to Meador; Claim 33 was rejected under 35 U.S.C. 102(b) as anticipated by U.S. Patent No. 5,886,326 to Tang; Claims 1-6, 11, 12, 22, 23, 25-29, and 36-43 were rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 4,961,391 to Mak et al. (hereinafter “Mak”) in view of U.S. Patent No. 5,595,483 to Melber et al. (hereinafter “Melber”); Claims 7-10, 37, 44, and 45 were rejected under 35 U.S.C. 103(a) as unpatentable over Fochtman in view of Melber; Claims 13-19, 21, 23-29, and 31 were rejected under 35 U.S.C. 103(a) as unpatentable over U.S. Patent No. 5,619,936 to Veltmann in view of Mak; Claim 45 was rejected under 35 U.S.C. 103(a) as unpatentable over Fochtman in view of Rickhard and Melber; Claim 30 was indicated as allowable if rewritten in independent form; and Claims 34 and 35 were allowed.

Applicants note, with appreciation, the indication of allowable subject matter.

Applicants now separately address the rejections of the method and apparatus claims.

Method Claims 1-6, 11, 12, 22, and 36 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Mak in view of Melber. Method Claim 32 stands rejected under 35 U.S.C. 102(b) as anticipated by Meador. Method Claim 33 stands rejected under 35 U.S.C. 102(b)

as anticipated by Tang. Method Claims 7-10 stand rejected under 35 U.S.C. 103(a) as unpatentable over Fochtman in view of Melber. Those rejections are respectfully traversed.¹

Though they are different in scope, each of amended independent Claims 1, 11, and 22 recites heating, under a vacuum state, a gaseous substance produced by thermal decomposition of an object containing organic halides; each of amended independent Claims 32 and 33 recites heating, under a vacuum state, a gaseous substance produced by thermal decomposition of an object; and amended independent Claim 36 recites heating, under a vacuum state, a gaseous substance produced by a heated residue. Claims 2-10 and 12 depend from Claims 1 and 11, respectively.

Applicants' Figure 2 illustrates a non-limiting example of an apparatus configured to heat, under a vacuum state, of gaseous substance. More particularly, gases produced by thermal decomposition of a compound in the furnace 1 are introduced to a reducing tort 4. In one example, the reducing tort 4 heats the gases, under the vacuum of the furnace 1, to not less than 500 °C to dissociate oxygen and chlorine atoms forming dioxins.² The consumption of a reducing agent within the reducing tort 4 is lessened by heating under a vacuum.³

Neither Mak, Fochtman, nor Melber teaches the claimed heating step of Claims 1, 11, 22, 32, 33, and 36. Rather, in the thermal treatment process of Mak, a released vapor containing harmful organics is purged from a kiln to produce an off gas mixture that is conditioned for discharge to the atmosphere.⁴ There is no indication that the conditioning of the off gas mixture includes the claimed heating under vacuum.⁵ In Meador, vapors are removed and subjected to a liquid/gas separation.⁶ In Tang, vapor is drawn into a cooler 24

¹ Applicants note that Claims 32 and 33 are not addressed by the Office Action, i.e., neither indicated as rejected or allowed.

² Specification, page 28, line 8 – page 30, line 11.

³ Specification, page 30, lines 5-11.

⁴ Mak, Abstract.

⁵ Mak, col. 3, lines 7-13.

⁶ Meador, Abstract.

and then condensed and drained.⁷ In Fochtman, evolved vapors are subjected to catalytic oxidation, in the presence of steam, at gas phase conditions.⁸ In Melber, vaporizable substances are exhausted from treatment chambers and then condensed.⁹ Thus, none of the above-noted references teach the claimed heating of a produced vapor under vacuum.

Accordingly, for the above-stated reasons, Applicants respectfully request that the rejection of method Claims 1-6, 11, 12, 22, and 36 under 35 U.S.C. 103(a) as unpatentable over Mak in view of Melber be withdrawn; method Claim 32 under 35 U.S.C. 102(b) as anticipated by Meador be withdrawn; method Claim 33 under 35 U.S.C. 102(b) as anticipated by Tang be withdrawn; and method Claims 7-10 under 35 U.S.C. 103(a) as unpatentable over Fochtman in view of Melber be withdrawn.

Apparatus Claims 13 and 20 stand rejected under 35 U.S.C. 102(b) as anticipated by Fochtman. That rejection is respectfully traversed.

Independent apparatus Claim 13 recites means for introducing a heated residue of a soil to a hermetic zone; means for purging the hermetic zone by a purge gas which is substantially organic halide-free; and means for cooling the heated residue.

Fochtman does not teach the claimed means for purging the hermetic zone by a purge gas which is substantially organic halide-free; and means for cooling the heated residue. Rather, in Fochtman, a heated residue is purged and cooled in a manner susceptible to generating organic halides. More particularly, Fochtman utilizes water spray 8 to “cool the effluent” and nitrogen to “assist in carrying away evolved vapors from the heated feed”.¹⁰ Consequently, when heated residue is cooled at atmospheric pressure, there is a potential for generating and regenerating organic halides, such as dioxins. On the other hand, the claimed purge gas prevents the occurrence of such an event.

⁷ Tang, col. 2, lines 47-55.

⁸ Fochtman, col. 3, lines 56-61; col. 8, lines 25-59.

⁹ Melber, Abstract.

¹⁰ Fochtman, col. 15, lines 52-55; and col. 16, lines 9-12.

Accordingly, for the above-stated reasons, Applicants respectfully request that the rejection of Claims 13 and 20 under 35 U.S.C. 102(b) as anticipated by Fochtman be withdrawn.

Apparatus Claims 23, 25-29, and 37-43 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Mak in view of Melber. That rejection is respectfully traversed.

Independent apparatus Claim 23 recites a hermetic zone (i.e., completely sealed against the escape or entry of air); and means for introducing a heated residue to the hermetic zone. Independent apparatus Claim 37 recites a hermetic zone; a vacuum pump configured to pump out the hermetic zone to a vacuum state; and an introducing device configured to introduce a heated residue of the soil from the heating device to the hermetic zone. Claims 25-29 and 38-43 depend from Claims 23 and 37, respectively.

The Office Action cites Mak as teaching each feature of Claims 23 and 37, with the exception of citing Melber as teaching a vacuum pump. However, Mak does not teach the introduction of a heated residue to a hermetic zone, because Mak pumps a purge gas into the kiln at a steady flow rate.¹¹

Further, with respect of Claim 37, Mak does not teach the pumping of a hermetic to a vacuum state. Indeed, because Mak is concerned with varying oxygen concentrations to prevent the combustion of vaporized components,¹² Mak would not suggest a vacuum heating process.

Applicants, on the other hand, have recognized the advantages of heating under vacuum state. Two advantages of thermally decomposing halides under vacuum state are as follows. First, by increasing the mean free path of all molecules in the chamber, i.e., by decreasing molecular collisions, the vacuum reduces the generation and regeneration of organic halides. Second, by decreasing the partial pressure of all compounds in the chamber,

¹¹ Mak, col. 5, lines 41-50.

¹² Mak, col. 9, lines 51-54.

the vacuum reduces the concentration of dioxins in both the gas phase and the heated residue.¹³

Applicants' approach has been acknowledged by several academic societies: "Organohalogen Compounds Vol. 54", 2001, page 157 (Attachment I); "Summary and Supplement", "21st International Symposium on Halogenated Environmental Organic Pollutants and POPS", page 50, fifth paragraph (Attachment II); "Organohalogen Compounds Vol. 58", 2002 (Attachment III); and "Organohalogen Compounds Vol. 63" of 2003 (Attachment IV). Copies of the relevant pages of these documents were provided with Applicants response to the Office Action mailed April 21, 2003.

Accordingly, for the above-stated reasons, Applicants respectfully request that the rejection of Claims 23, 25-29, and 37-43 under 35 U.S.C. 103(a) as unpatentable over Mak in view of Melber be withdrawn.

Apparatus Claims 37, 44, and 45 stand rejected under 35 U.S.C. 103(a) as unpatentable over Fochtman in view of Melber. That rejection is respectfully traversed.

Independent Claim 37 recites a purging device configured to purge the hermetic zone by a purge gas which is substantially organic halide-free; and a first cooling device configured to cool the heated residue. The Office Action cites Fochtman as teaching each feature of Claim 37, with the exception of citing Melber as teaching a vacuum pump. For the reasons stated above, Applicants submit that Fochtman does not teach the claimed purging device and first cooling device.

Accordingly, Applicants respectfully request that the rejection of apparatus Claims 37, 44, and 45 under 35 U.S.C. 103(a) as unpatentable over Fochtman in view of Melber be withdrawn.

¹³ The advantages of a heating under a vacuum state are illustrated by Applicants' Figure 12.

Apparatus Claims 13-19, 21, 23-29, and 31 stand rejected under 35 U.S.C. 103(a) as unpatentable over Veltmann in view of Mak. That rejection is respectfully traversed.

The Office Action cites Veltmann as teaching each feature of independent Claims 13 and 23, with the exception of citing Mak as teaching the claimed means for purging the hermetic zone by a purge gas which is substantially organic halide free.

However, as noted above, Mak teaches to control oxygen concentration during thermal decomposition by pumping a purge gas at a steady flow into the kiln. Thus, the purge gas of Mak comprises oxygen. To the contrary, independent Claims 13 and 23 recite the use of a “purge gas which is substantially organic halide-free.” Thus, unlike the purge gas taught in Mak, the purge gas taught by Applicants will not contribute to the generation of organic halides when cooling the heated residue at atmospheric pressure.

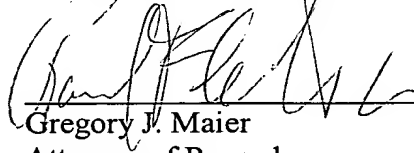
Accordingly, Applicants respectfully request that the rejection of Claims 13-19, 21, 23-29, and 31 under 35 U.S.C. 103(a) as unpatentable over Veltmann in view of Mak be withdrawn.

Apparatus Claim 45 stands rejected under 35 U.S.C. 103(a) as unpatentable over Fochtman in view of Rickhard and Melber. As Rickard and Melber do not cure the above-noted deficiencies of Fochtman with respect to independent Claim 37, Applicants respectfully request that the rejection of dependent Claim 45 under 35 U.S.C. 103(a) as unpatentable over Fochtman in view of Rickhard and Melber be withdrawn.

Consequently, in light of the above discussion and in view of the present amendment, the present application is believed to be in condition for allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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